2001 DODCAS
ASSESSMENT OF OSD COST ESTIMATING CAPABILITIES

NAVY PRESENTATION: LEONARD CHESHIRE

AUTOMATED INFORMATION SYSTEMS

ELECTRONICS SYSTEMS

SHIPS

AIS

	Investment (30%)			O&S (70%)
	PDRR	**EMD**	**Fielding**	
		$23B		**$54B**
Hardware	⬜⬜	🟨🟩	🟩🟩	🟨🟩
Software				
Non-COTS	🟥🟥	🟥🟨	⬜⬜	🟥🟥
COTS	🟥🟥	🟥🟥	⬜⬜	🟥🟥
Installation	⬜⬜	🟨🟨	🟨🟨	⬜⬜
Sys/Prog/Matl/Item Mgmt	🟨🟨	🟨🟨	🟨🟨	🟨🟨
Training	⬜⬜	🟨🟨	🟨🟨	🟨🟨
Data Maintenance	⬜⬜	⬜⬜	⬜⬜	🟨🟨
Mega Center Ops & Maint	⬜⬜	⬜⬜	⬜⬜	🟨🟨
Unit/Site Ops	⬜⬜	⬜⬜	⬜⬜	🟨🟨

Contributing Organizations

- Army Cost & Economic Analysis Center (CEAC)
- Naval Center for Cost Analysis (NCCA)
- Air Force Cost Analysis Agency (AFCAA)

AIS Background

- Primarily software "development" in nature
  - Development/modification of non-COTS <u>and</u> COTS
  - Integration of COTS
- Little-to-no hardware development since COTS
- Minimal contractor cost data reporting
  - Some CPR-like info
  - No CCDRs
- Rapid technology advancement translates into rapid technical baseline (i.e., CARD) obsolesence

AIS Assessment

- General
  - COTS PDRR/EMD changed from red-red to red-yellow
  - COTS hardware estimates are low risk: based on catalog or standard contract prices
  - But there is a paucity of return cost data & related cost estimating methodology for many of the other cost elements
- Software
  - Ongoing COTS electronics study has improved ability to estimate COTS SW modification & integration
  - Paucity of quality/comparable non-COTS development & maintenance data
  - Heavy reliance on models fed by subjective inputs
  - Sizing uncertainty

AIS Studies

- "Open" Estimating Tool for SW Intensive Programs with COTS HW & SW (ESC/Tecolote)

- AIS SW Cost Database (NCCA/TASC)

- COTS Database and Analysis Study(AFCAA/NCCA)

- Weapons System SW Maint. and AIS Cost Research Project (NCCA/Technomics)

Electronics

	Develop (22%)		Prod (43%)
	PDRR	**EMD** $26B	$32B
Hardware			
Antenna	red, yellow	yellow, yellow	yellow, green
Transmitter	red, yellow	yellow, yellow	yellow, green
Receiver	red, yellow	yellow, yellow	yellow, green
Transceiver	red, yellow	yellow, yellow	yellow, green
Signal/Frequency Generator	red, yellow	yellow, yellow (32%)	yellow, green (39%)
Data Processor	red, red	yellow, green	green, green
Signal Processor	red, red	yellow, green	green, green
Display & Control	red, red	yellow, green	green, green
Integration/Assy/Test/Checkout	red, yellow	yellow, yellow	yellow, yellow
Software	red, red (8%)	red, yellow	white, white
Platform Integration & Installation	red, red (15%)	red, yellow	yellow, yellow (24%)
SE/PM	red, yellow	yellow, yellow	yellow, yellow
System Test and Evaluation	red, yellow	yellow, yellow	yellow, green
Training	red, yellow (45%)	yellow, yellow	yellow, yellow (37%)
Data	red, yellow	yellow, yellow	yellow, yellow
Spares & Repair Parts	white, white	yellow, yellow	yellow, green

Electronics

O&S (35%)

Mission Personnel	**(29%)**	🟩🟩
Unit Level Consumption — Spares/Repair Parts(11%)	**(13%)**	🟨🟨
Intermediate Maintenance	**(< 1%)**	🟨🟨
Depot Maintenance	**(7%)**	🟨🟨
Contractor Support	**(included above)**	🟨🟨
Sustaining Support — Mod Kits (25%) / Engr Supt(11%) / SW Maint(5%)	**(41%)**	🟥🟨
Indirect Support — Training (9%) / PCS (1%)	**(10%)**	🟥🟨

Contributing Organizations

- Air Force Cost Analysis Agency (AFCAA)
- Naval Air Systems Command (NAVAIR)
- Naval Sea Systems Command (NAVSEA)
- Naval Center for Cost Analysis (NCCA)
- OSD Program Analysis & Evaluation (PA&E)
- Technomics, Inc.
- Tecolote Research, Inc.

Electronics Assessment

- General
  - Pace of electronics technology = cost models with short shelf lives
  - Thus, cost models should incorporate impact of technology trends
- Software
  - Paucity of quality/comparable development & maintenance data
  - Heavy reliance on models fed by subjective inputs
  - Sizing uncertainty
- Platform Integration & Installation
  - Lack of understanding of explanatory variables
  - Little-to-no data and therefore methodology
- Processor, display & control HW
  - Availability of COTS price info
  - Knowledge of COTS price trends

Electronics Studies
Software

Software

- SMC Software Database (SMC/MCR)
- SW Development Cost/Technical Database (NCCA/MCR)
- SW Development Estimating Handbook - Phase One (NCCA)
- Weapons Systems SW Maint and AIS Cost Research Project, (NCCA/Technomics)
- Software Cost Estimating (SSDC/SAIC)
- Improved SW Cost Report Processes for Wpn Systems (PA&E/IDA)*
- Software Cost & Schedule Estimating, NAVAIR/SBIR Phase I, Contractor TBD

Electronics Studies
Integration/Installation

Platform Integration & Installation

- PRICE Model Calibration Studies for F-15 & B1 Integ (ASC/PRICE)
- Model for Integrating Cost w/Op Effectiveness (ASC/Technomics)
- C^3 Platform Integration Database (AFCAA/MCR)
- Naval Aviation Modification Model (NAMM), NAVAIR/MCR, 2000
- Aircraft Weapon and Avionics Certificqation Model, NAVAIR/SBIR Phase II – Technomics, 2001
- NAVAIR GPS Integration Database, NAVAIR/ARINC

Electronics Studies
Others

- Case Study, APG-63 V(1) Radar, F-15 Case Study (ASC)
- Avionics Nonrec Design Cost and Develop Time (NAVAIR/MCR)
- Development CERs (BMDO/MCR)
- Improved Methodologies for Estimating Dev Costs (PA&E/LMI)*
- Avionics Systems Data Collection (AFCAA/Tecolote)
- Comm and Elex Cost Database/Methodology (CEAC/Technomics)
- Electronics Cost/Technical Database (NCCA/Tecolote)
- Avionics Support Cost Factors Update (ASC)
- Transmit/Receive (T/R) Module Model Update (NCCA/Tecolote)
- Incentive Models for Cost Progress (PA&E/LMI)*
- Parametric O&S CERs for Shipboard Elex (ONR/NCCA&Tecolote)*
- NAVAIR Avionics Cost and Technical Database, NAVAIR/Tecolote
- Weapons System SW Development Data Collection (NCCA/Upper Mohawk)

Ships

	Develop (1%)	Prod (31%)	
		Lead	**Follow**
	$5B	**$47B**	
Hardware			
Hull Structure	🟥🟨	🟨🟩 (17%)	🟩🟩
Propulsion Plant	🟥🟨	🟨🟩 (6%)	🟩🟩
Electric Plant	🟥🟨	🟨🟩 (7%)	🟩🟩
Command & Surveill Systems	🟥🟨	🟨🟨 (13%)	🟨🟩
Auxiliary Systems	🟥🟨	🟨🟩 (11%)	🟩🟩
Outfitting &Furnishings	🟥🟨	🟨🟩 (8%)	🟩🟩
Armament	🟥🟨	🟨🟨 (10%)	🟨🟩
Integration/Engineering	🟥🟨	🟨🟨 (10%)	🟨🟨
Ship Assy & Supt Services	⬜⬜	🟨🟨 (16%)	🟨🟨
Software	🟥🟥	🟥🟨	⬜⬜
SE/PM	⬜⬜	🟨🟨	🟨🟨
System Test and Evaluation	⬜⬜	🟨🟨	🟨🟨
Training	⬜⬜	🟨🟨 (2%)	🟨🟨
Data	⬜⬜	🟨🟨	🟨🟨
Spares & Repair Parts	⬜⬜	🟨🟩	🟩🟩

Ships

O&S (68%)

Mission Personnel	**(44%)**	🟩🟩
Unit Level Consumption { Spares/Repair Parts(7%) POL(6%)	**(16%)**	🟨🟨
Intermediate Maintenance	**(<1%)**	🟨🟨
Depot Maintenance	**(30%)**	🟨🟨
Contractor Support	**(included above)**	🟨🟨
Sustaining Support	**(7%)**	🟥🟨
Indirect Support	**(3%)**	🟥🟨

Contributing Organizations

- Naval Sea Systems Command (NAVSEA)
- Naval Center for Cost Analysis (NCCA)
- OSD Program Analysis & Evaluation (PA&E)

Ships Background

- PDRR for ships is different
  - Platform-specific engr/feasibility studies, but little-to-no platform-specific hardware/systems designed or built
  - Most other PDRR efforts have multi-platform application
    - Electronics & armament estimated by cost community
    - Hull/mechanical/electrical (HM&E) estimated by engr community
- EMD for ships is different too
  - Platform-specific design studies and some platform-specific hardware/systems designed & built (e.g., electronics & armament)
- Procurement for ships is different too
  - Lead ship is essentially a procurement funded, fielded "prototype"

Ships Assessment

- Software
  - Paucity of quality/comparable development & maintenance data
  - Heavy reliance on models fed by subjective inputs
  - Sizing uncertainty
- Integ/Engr, Ship Assy & Supt Svcs, SE/PM, Trning, Data
  - Lack of understanding of explanatory variables
  - Therefore, little-to-no meaningful methodology
- HW, Spares & Repair Parts
  - Less complex subsystems are better understood
  - Likewise for associated spares & repair parts

Ship Studies
Software

- Calibration and Validation of the Sage Software Cost/Schedule Estimating System to USAF Databases (AFIT)
- Calibration and Validation of the Cocomo Ii.1997.0 Cost/Schedule Estimating Model to the SMC Database (AFIT)
- Calibration and Validation of the Checkpoint Model to the Air Force Electronic Systems Center Software Database (AFIT)
- A Preliminary Study of Using SEI's CMM to Set Statistical Control Bounds on DoD Contractor Cost and Schedule Performance (AFIT)
- C^2 Cost Information Center Web Site (ESC/FMC)
- "Open" Estimating Tool for Software-Intensive Programs with COTS H/W & S/W (ESC/FMC)

Ship Studies
EMD/Production

- Shipbuilding Process Simulation Model (NAVSEA)
- Material Vendor Survey (NAVSEA)
- AACEI Cost Model for Aircraft Carriers (NAVSEA)

- SEA 0177 Shipyard Workload Model Improvements (NAVSEA)
- Private Shipbuilder Overhead Costs (NAVSEA/PA&E/IDA)
- Cost Estimation for the 21st Century Mfg Environment (PA&E/IDA)
- Acquisition Initiatives in the New Environment: Multiyear Procurement Update (USD(A&T)/IDA)
- Government In-House Cost Database/Estimating Method (NCCA)
- CCDR Clearinghouse/Repository (PA&E/IDA)

Ship Studies
O&S

- Indirect Cost Database Related to the VAMOSC Database (NCCA)
- Top-Level Ship Operating and Support Cost Model (NCCA)
- Ship Operating and Support Cost Analysis Model (OSCAM-Ship) (NCCA)
- Shipboard Systems Operating and Support Cost Analysis Model (OSCAM-Sys) (NCCA)
- Analysis of Operation and Support (O&S) Costs for Aircraft Carriers Aircraft Carrier (NSWCCD)
- Cost of Manpower Estimating Tool (COMET) Model (NCCA)
- Total Ownership Cost Reduction Process and Templates (NAVSEA)

Ship Studies
Life Cycle

- CVNX Total Ownership Cost Database, Model and Process Development, December 01 (NAVSEA)
- Theater Surface Combatant (TSC) Technology Refresh Cost Model, October 03 (NAVSEA)
- "System of Systems: Technology Refresh Cost Model, October 01 (NAVSEA)
- Technology Assessment and Management (TeAM Cost Analysis, September 00, (NAVSEA)
- Product-Oriented Design and Construction (PODAC) Cost Model, December 99 (NSWCCD)
- Aircraft Carrier Technology Economic Analysis Model (TEAM), November 99 (NSWCCD)
- Leading Edge Advanced Prototyping for Ships (LEAPS) Cost Support, September 00 (NSWCCD)
- Ships Integration Study, October 01 (NCCA)
- Total Ownership Costs and Business Case Analysis (NAVSEA)